Predicting Productivity Returns on Investment: 30 Years of Peer Review, Grant Funding, and Publication of Highly Cited Papers at the NHLBI

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Disclosures: None

Background

- Peer review scores guide funding decisions
- Not clear if peer review predicts productivity

Objective

- To assess field-normalized citation impact and citation impact per $million spent for NHLBI-funded cardiovascular grants according to peer review percentile ranking

Methods

- Cohort: 6873 de novo NHLBI R01 grants funded between 1980 and 2011; all grants were investigator-initiated and received a peer-review percentile ranking; 27% were renewed at least once
- Publications: 62,468 articles
- Citation metrics: Using Thomson-Reuters InCites database each publication received a percentile score between 0 (best) and 100 (worst); each measure accounted for field (out of a possible 252 fields), year of publication, and type of publication
- Outcomes: For each grant, number of top-10% papers produced per grant (that is papers among the top 10% cited for its field, year, and type); for each grant, number of top-10% papers per $million spent (BRDPI inflation adjusted to 2000 constant dollars)
- Top-10% papers: 13,507 (22% of total)
- Analyses: Scatter plots with loess smoothers; ROC areas with outcome being production of ≥ one top-10% paper or ≥ one top-10% paper per $million spent

Results

Figure 1. Association between number of top-10% articles generated per grant and grant percentile ranking. Scatter plot with density shading and loess smoother (top); loess smoother only (bottom). ROC area 0.52 (95% CI 0.51 – 0.53).

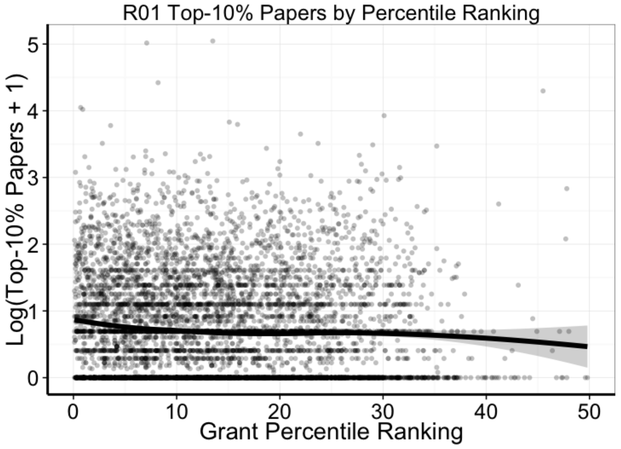


Figure 2. Associations between total awarded costs and percentile ranking (top) and between number of top-10% articles generated per grant and total awarded costs (bottom). There was a similar association with requested costs.

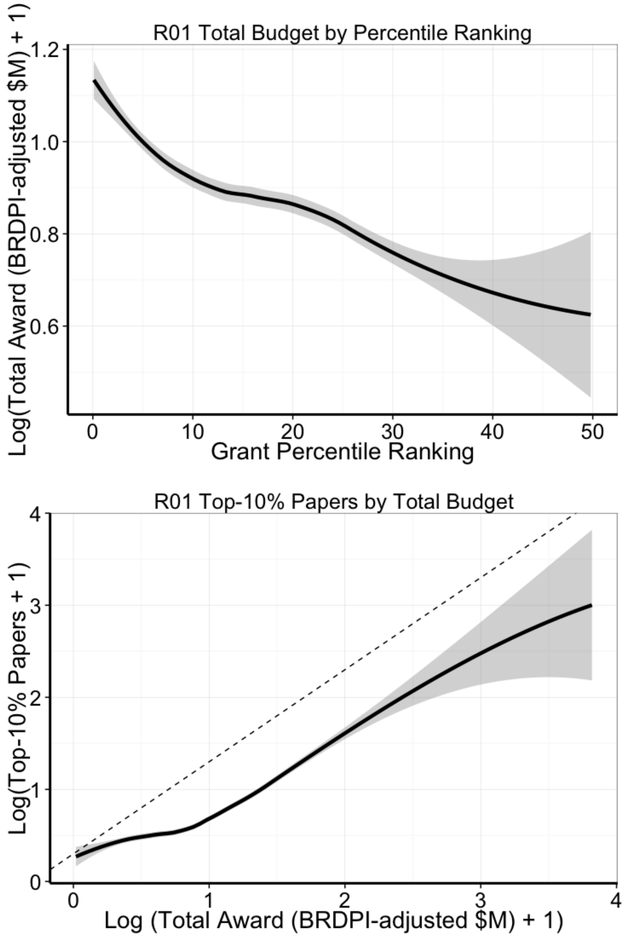
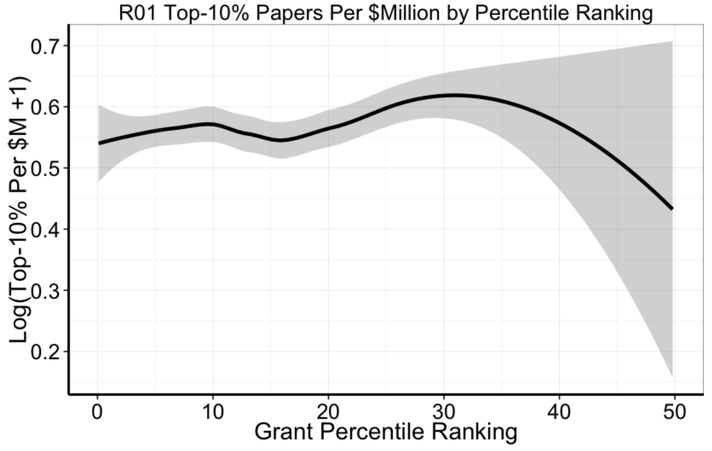


Figure 3. Loess smoother showing association between number of top-10% articles produced per $million spent. ROC area 0.49, 95% CI 0.47 – 0.50).



Summary and Limitations

- Modest association between percentile ranking and larger number of top-10% articles produced per grant
- Higher budget grants receive better percentile ranking and are more productive with diminishing marginal returns
- No association between percentile ranking and number of top-10% articles per $million spent
- Citation metrics only one reflection of scientific impact

Conclusions

- Peer review percentile ranking does not predict return on investment as measured by citation impact per $million spent

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